PB81-123499

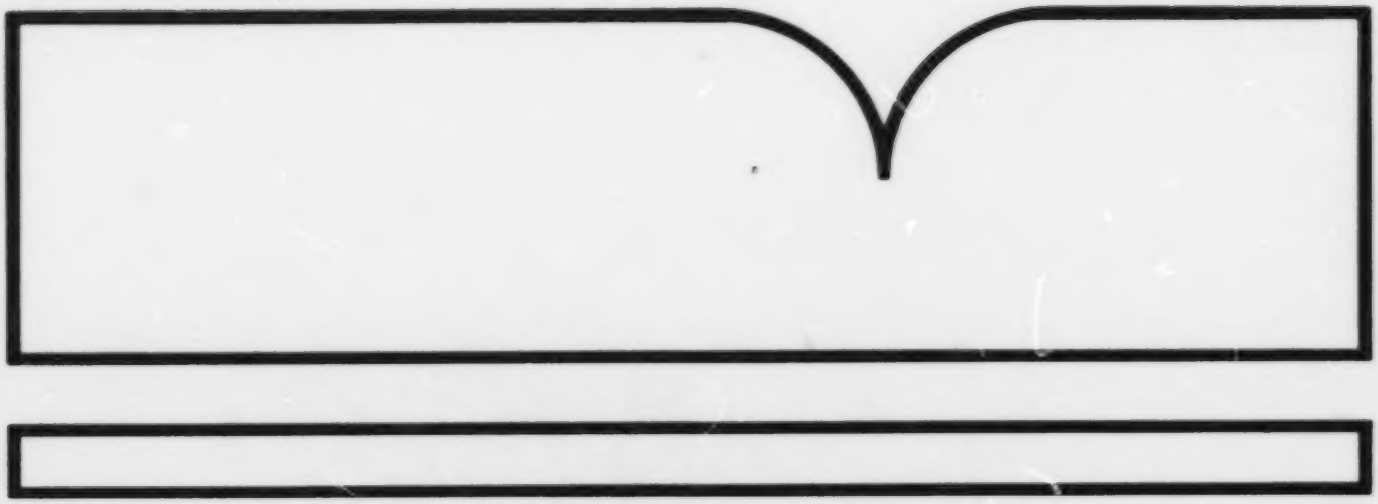
Testing Support for Evaluation of Inspection/Maintenance Issues (Test Group Nos. 6 and 8)

Hamilton Test Systems, Inc.
Phoenix, AZ

Prepared for

Environmental Protection Agency
Ann Arbor, MI

1979



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16. ABSTRACT

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The intent of test group no. 8 was to provide test data to be used to evaluate the ability of various catalyst diagnostic tests to diagnose poisoned catalysts. The poisoning of the catalyst was accomplished by accumulating mileage using tankfuls of leaded fuel. After repeated tankfuls of leaded fuel were consumed, mileage was accumulated using tankfuls of unleaded fuel to provide data for evaluation of the rejuvenation process of the catalytic converter.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Inspection	Catalytic converters	Leaded fuel	
Maintenance	Catalysts	Unleaded fuel	
Exhaust gases	Air intakes	Leaded gasoline	
Exhaust emissions	Tests	Unleaded gasoline	
Motor vehicles			
Automobiles			

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TESTING SUPPORT FOR EVALUATION OF INSPECTION/MAINTENANCE ISSUES

(TEST GROUP NOS. 6 & 8)

by

Hamilton Test Systems, Incorporated
2303 East Thomas Road
Phoenix, Arizona 85016

Contract No. 68-03-2829
EPA Project Officer: H. Anthony Ashby

Prepared for

U. S. ENVIRONMENTAL PROTECTION AGENCY
Office of Mobile Source Air Pollution Control
Emission Control Technology Division
Ann Arbor, Michigan 48105

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TEST GROUP NO. 6 REPORT

5.6 TEST GROUP NO. 6 - HEATED AIR INTAKE DISABLEMENT

5.6.1 SUMMARY

The intention of this test group was to evaluate the effect on exhaust emissions of disabling the heated air intake system.

Ten (10) vehicles were selected from the loaner fleet and were tested before and after disablement of the heated air intake system. The testing consisted of an FTP, Highway Fuel Economy Test (HFET), 50 MPH Cruise Test, Four Mode Test, Two Mode Test, Propane Gain Checks, and a complete diagnostic inspection.

No discernible difference was found between the before and after results. This result was attributed to the short period of time the heated air damper remained in the open position for the "before disablement" test. Since all vehicles were cold soaked at a nominal temperature of 77° F, the temperature rapidly reached an operating temperature to close the damper.

5.6.2 VEHICLE SELECTION

The vehicles for this test group were selected from the loaner fleet of vehicles. The ten (10) vehicles selected were as follows:

EPA NO.	MODEL YEAR	MAKE	MODEL	VEH. IDENT. NO.	ENGINE	CYL.
09001	1980	CHEV	CITATION	1X687A6251172	173-2V	6
09902	1980	BUICK	SKYLARK	4B697AW254242	173-2V	6
09903	1980	BUICK	SKYLARK	4B697AW256475	173-2V	6
92301	1979	CHEV	CAPRICE	1N69G9C166105	305-2V	8
92302	1979	CHEV	CAPRICE	1N69G9C176939	305-2V	8
92303	1979	CHEV	CAPRICE	1N69G9C173855	305-2V	8
92304	1979	CHEV	CAMARO	1Q87G9L589015	305-2V	8
92501	1979	PONT	BONNEVILLE	2N69Y9X115780	301-2V	8
92801	1979	OLDS	CUTLASS	3R47F9M528608	260-2V	8
92802	1979	OLDS	CUTLASS	3R47F9M488723	260-2V	8

All ten vehicles have automatic transmissions and were equipped with Air Conditioning, Catalytic Converter, EGR and Electronic Ignition. The Citation and Skylarks were also equipped with an Air Injection System.

5.6.3 TEST PROCEDURES

5.6.3.1 Initial Test Sequence

The Idle Test (Ref. para. 4.3.1) at the DEQ test station was the first test performed. Upon verification that the vehicle passed the DEQ test, the following sequence of tests was run at the HTS facility:

- Idle Test (Ref. para. 4.3.1)
- Diagnostic Inspection (Ref. para. 4.3.2)
- Federal Test Procedure (FTP) (Ref. para. 4.3.3 and 4.3.4)
- 50 MPH Cruise Test (Ref. para. 4.3.8)
- Highway Fuel Economy Test (HFET) (Ref. para. 4.3.6)
- Four Mode Test (Ref. para. 4.3.9)
- Two Mode Test (Ref. para. 4.3.7)
- Propane Gain Checks (Ref. para. 4.3.10)

The Propane Gain Checks were performed in three different conditions with the vehicle in neutral gear and then repeated in Drive gear. The conditions were:

- with PCV valve in place,
- with PCV valve removed from its seat and drawing underhood air,
- with PCV valve in place and the fresh air hose in the induction (PCV) system removed at the air cleaner.

5.6.3.2 Heated Air Intake Disabled Test Sequence

After the initial test sequence was completed, the heated air intake was disabled by removing the stove pipe to the air cleaner. Each vehicle was then retested per all tests specified in the initial test sequence except for the DEQ test.

5.6.3.3 Inertia Weights and Horsepower Settings

The inertia weights and horsepower settings used for the FTP and HFET tests were as follows:

	Inertia Wt.	Act. HP Setting
Citation	3000	7.3
Skylark	3000	7.3
Caprice	4000	13.3
Camaro	4000	11.4
Bonneville	4500	13.3
Cutlass	3500	12.2

5.6.4 TEST RESULTS

The test results are shown on the following tables:

DEQ & HTS Idle Tests	- Table 5.6-1
Two Mode & 50 MPH Cruise Tests	- Table 5.6-2
Four Mode Test	- Table 5.6-3
FTP & HFET	- Table 5.6-4
Propane Gain Test	- Table 5.6-5

Table 5.6-6 provides the total grams collected of HC, CO, CO_2 and NO_x for each of the three periods (cold transient, cold stabilized and hot transient).

The legends for the tables are as follows:

Legend for Tables 5.6-1 through 5.6-3

EPA NO.	- Identification Number (1st digit represents vehicle model year)
S	- Test Sequence (1 = Initial, 2 = After Heated Air Intake Disablement)
1ST	- Initial Idle Test
2500	- High Idle Test
2ND	- Second Idle Test
STA	- Status (The three letters represent the DEQ Pass/Fail status for HC, CO and RPM respectively)
HC	- Hydrocarbons in ppm (Measurements are in hexane for all readings except for "LAB" readings which are in total hydrocarbons)
CO	- Carbon Monoxide in Percent
NO_x	- Oxides of Nitrogen in ppm
RPM	- Engine Idle RPM
LAB	- Laboratory Analyzers
GARAGE	- EPA-75 Garage Analyzer

Legend for Table 5.6-4

ODOM	-	Odometer reading
HC	-	Hydrocarbon Emissions in grams per mile
CO	-	Carbon Monoxide Emissions in grams per mile
CO_2	-	Carbon Dioxide Emissions in grams per mile
NO_x	-	Oxides of Nitrogen (uncorrected) Emissions in grams per mile
NO_xC	-	Oxides of Nitrogen Emissions corrected for humidity in grams per mile
MPG	-	Miles per gallon calculated by the Carbon Balance Method

TABLE 5.6-1 DEQ & HTS IDLE TESTS

	DEQ IDLE TEST									HTS IDLE TEST											
	HC			CO			RPM			HC			CO			NOX			RPM	
EPA NO	S	1ST	2500	2ND	1ST	2500	2ND	1ST	2ND	STA	1ST	2500	2ND	1ST	2500	2ND	IST	2500	2ND	1ST	2ND
09901	1	15	20	15	.0	.0	.0	750	750	PPP	20	10	10	.0	.0	.0	70	120	80	800	780
09901	2										10	40	0	.0	.9	.0	80	80	80	720	750
09902	1	15	15	15	.0	.0	.0	800	800	PPP	10	20	10	.0	.0	.0	70	150	80	810	780
09902	2										10	20	10	.0	.0	.0	70	140	60	760	760
09903	1	15	15	15	.0	.0	.0	800	800	PPP	20	20	10	.0	.1	.0	80	150	90	750	750
09903	2										10	10	10	.0	.2	.0	80	120	90	780	800
92301	1	25	30	30	.0	.0	.0	750	750	PPP	120	10	60	.0	.0	.0	70	180	80	640	680
92301	2										80	10	0	.0	.0	.0	80	140	100	710	720
92302	1	25	20	55	.0	.1	.0	1000	1000	PPP	90	10	20	.0	.0	.0	60	140	60	670	710
92302	2										90	10	20	.0	.0	.0	70	120	70	680	700
92303	1	30	20	30	.0	.0	.0	800	800	PPP	20	10	10	.0	.0	.0	50	125	60	680	720
92303	2										30	20	20	.0	.0	.0	60	90	70	740	780
92304	1	30	55	25	.0	.5	.0	600	600	PPP	110	20	60	.0	.0	.0	40	120	50	570	640
92304	2										50	20	40	.0	.0	.0	60	100	80	930	650
92501	1	20	25	25	.0	.1	.0	550	550	PPP	100	20	60	.0	.0	.0	60	170	60	670	670
92501	2										120	50	90	.0	.0	.0	60	190	70	640	690
92801	1	25	120	35	.0	.0	.0	700	700	PPP	40	100	30	.0	.0	.0	70	200	80	600	600
92801	2										50	190	50	.0	.0	.0	40	180	100	590	630
92802	1	40	60	40	.0	.0	.0	650	650	PPP	50	60	50	.0	.0	.0	40	230	50	640	650
92802	2										20	60	20	.0	.0	.0	60	180	70	820	690

TABLE 5.6-2 TWO MODE & 50 MPH CRUISE TESTS

	--TWO MODE (30 MPH)--					---TWO MODE (IDLE)---					----- MPH CRUISE----				
	----LAB-----			GARAGE		----LAB-----			GARAGE		----LAB----			GARAGE	
EPA NO S	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO
09901 1	35	.0	205	10	.0	11	.0	90	0	.0	50	.0	469	10	.0
09901 2	35	.0	157	10	.0	5	.0	85	10	.0	32	.0	441	20	.0
09902 1	84	.0	658	20	.0	35	.0	130	20	.0	23	.0	583	10	.0
09902 2	84	.0	562	20	.0	20	.0	131	10	.0	50	.0	749	10	.0
09903 1	47	.0	243	10	.0	16	.0	91	10	.0	56	.0	527	10	.0
09903 2	38	.0	211	50	.0	4	.0	104	40	.0	56	.0	547	30	.0
92301 1	96	.0	284	20	.0	115	.0	115	20	.0	57	.0	292	10	.0
92301 2	96	.0	292	20	.0	115	.0	180	20	.0	50	.0	342	10	.0
92302 1	99	.0	223	20	.0	99	.0	101	20	.0	87	.0	285	20	.0
92302 2	145	.0	293	20	.0	102	.0	101	10	.0	65	.0	388	10	.0
92303 1	93	.0	255	20	.0	117	.0	76	20	.0	157	.0	285	30	.0
92303 2	78	.0	186	20	.0	99	.0	74	20	.0	78	.0	293	20	.0
92304 1	136	.0	192	20	.0	127	.0	55	20	.0	63	.0	232	20	.0
92304 2	158	.0	210	20	.0	133	.0	132	10	.0	142	.0	277	20	.0
92501 1	121	.0	568	20	.0	84	.0	80	10	.0	81	.0	877	20	.0
92501 2	142	.0	678	30	.0	142	.0	115	20	.0	81	.0	986	20	.0
92801 1	335	.0	606	60	.0	212	.0	223	50	.0	188	.0	713	40	.0
92801 2	114	.0	168	40	.0	32	.0	34	20	.0	117	.0	668	40	.0
92802 1	172	.0	510	40	.0	96	.0	159	30	.0	163	.0	711	40	.2
92802 2	194	.0	402	60	.0	120	.0	96	40	.0	105	.0	694	50	.0

TABLE 5.6-3 FOUR MODE TEST

	---IDLE NEUTRAL---					--------2500 RPM--------					----IDLE NEUTRAL----					----IDLE IN GEAR----				
	---LAB----			GARAGE		-----LAB-----			GARAGE		----LAB----			GARAGE		----LAB-----			GARAGE	
EPA NO S	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO
09901 1	50	.0	68	10	.0	947	2.6	50	50	2.6	29	.0	75	10	.0	23	.0	115	10	.0
09901 2	57	.0	65	10	.0	121	.0	142	20	.0	8	.0	85	10	.0	32	.0	110	10	.0
09902 1	75	.0	83	20	.0	38	.0	152	20	.0	50	.0	88	20	.0	54	.0	132	20	.0
09902 2	59	.0	84	20	.0	63	.0	216	20	.0	26	.0	99	20	.0	26	.0	136	20	.0
09903 1	35	.0	86	20	.0	136	.0	171	20	.0	47	.0	106	20	.0	29	.0	99	10	.0
09903 2	26	.0	79	30	.0	215	.0	39	50	.0	81	.0	81	30	.0	56	.0	104	20	.0
92301 1	84	.0	147	20	.0	66	.0	117	10	.0	99	.0	98	20	.0	66	.0	142	20	.0
92301 2	109	.0	85	20	.0	50	.0	187	20	.0	99	.0	80	20	.0	60	.0	142	20	.0
92302 1	111	.0	39	20	.0	53	.0	108	20	.0	68	.0	74	20	.0	62	.0	106	20	.0
92302 2	78	.0	56	10	.0	26	.0	136	0	.0	68	.0	64	0	.0	59	.0	69	10	.0
92303 1	200	.0	39	30	.0	93	.0	108	30	.0	108	.0	61	30	.0	81	.0	113	20	.0
92303 2	65	.0	44	20	.0	68	.0	104	20	.0	56	.0	56	20	.0	44	.0	89	20	.0
92304 1	81	.0	33	20	.0	87	.0	130	20	.0	96	.0	53	20	.0	75	.0	45	20	.0
92304 2	130	.0	35	20	.0	200	.0	120	20	.0	148	.0	75	20	.0	102	.0	40	20	.0
92501 1	87	.0	50	20	.0	60	.0	182	20	.0	75	.0	68	20	.0	35	.0	43	10	.0
92501 2	158	.0	48	20	.0	75	.0	210	20	.0	106	.0	83	20	.0	60	.0	112	20	.0
92801 1	154	.0	56	35	.0	494	.0	132	80	.0	130	.0	65	40	.0	93	.0	84	30	.0
92801 2	68	.0	53	30	.0	546	.0	166	100	.0	68	.0	65	40	.0	44	.0	84	30	.0
92802 1	139	.0	65	40	.2	246	.0	214	50	.2	84	.0	77	40	.2	68	.0	77	30	.2
92802 2	117	.0	56	30	.0	234	.0	199	40	.0	87	.0	68	20	.0	56	.0	87	30	.0

TABLE 5.6-4 FTP & HFET

				FTP						HFET				
EPA NO	S	DATE	ODOM	HC	CO	CO2	NOX	NOXC	MPG	HC	CO	CO2	NOX	MPG
09901	1	800611	1203	.20	3.76	457.5	1.68	1.65	19.1	.03	.05	322.6	1.71	27.47
09901	2	800612		.25	3.73	484.7	1.57	1.55	18.0	.03	.07	333.2	1.62	26.60
09902	1	800612	995	.23	2.32	449.4	2.06	1.99	19.5	.01	.01	294.1	1.82	30.15
09902	2	800617		.16	2.22	487.4	2.20	2.03	18.0	.03	.01	334.7	2.59	26.49
09903	1	800612	519	.15	3.50	500.6	1.67	1.58	17.5	.03	.03	333.6	1.88	26.57
09903	2	800613		.26	3.40	491.5	1.62	1.51	17.8	.03	.10	332.1	1.84	26.68
92301	1	800603	8774	.72	11.66	528.6	1.85	1.73	16.1	.07	.64	383.0	1.29	23.08
92301	2	800604		.62	10.44	524.0	1.95	1.86	16.3	.06	.27	389.8	1.47	22.71
92302	1	800605	7016	.53	9.71	578.5	1.59	1.39	14.9	.05	.69	455.3	1.39	19.42
92302	2	800612		.54	9.97	574.1	1.63	1.49	15.0	.05	.84	441.9	1.68	20.00
92303	1	800605	8732	.50	8.17	561.5	1.78	1.57	15.4	.05	.84	436.9	1.45	20.23
92303	2	800610		.48	8.84	575.9	1.73	1.56	15.0	.05	.79	451.9	1.47	19.56
92304	1	800605	9837	.83	10.06	547.6	1.04	.96	15.7	.07	.99	402.0	.96	21.96
92304	2	800606		.66	9.01	550.7	.92	.89	15.6	.06	.68	399.7	1.16	22.12
92501	1	800611	7756	.53	5.73	527.3	2.66	2.65	16.5	.07	.11	390.9	3.23	22.66
92501	2	800612		.59	7.15	517.2	2.67	2.57	16.7	.08	.09	386.0	3.61	22.95
92801	1	791218	4018	.56	6.02	466.1	1.54	1.44	18.6	.10	.90	370.3	2.68	23.84
92801	2	791219		.54	5.31	474.7	1.58	1.51	18.3	.08	.51	370.7	2.58	23.86
92802	1	791231	13089	.58	6.13	479.6	2.08	1.87	18.1	.07	.29	375.3	3.09	23.59
92802	2	800102		.53	6.62	482.2	2.01	1.80	17.9	.07	.32	374.5	2.91	23.64

TABLE 5.6-5 PROPANE GAIN TEST

EPA NO	S	PCV IN PLACE NEUTRAL	PCV IN PLACE DRIVE	PCV REMOVED NEUTRAL	PCV REMOVED DRIVE	PCV HOSE REM'D NEUTRAL	PCV HOSE REM'D DRIVE
09901	1	20	DEC	60	DEC	20	DEC
09901	2	50	30	110	50	70	20
09902	1	60	20	90	30	60	10
09902	2	80	30	130	30	80	40
09903	1	30	DEC	80	DEC	40	DEC
09903	2	20	DEC	40	10	30	DEC
92301	1	130	40	200	70	120	50
92301	2	120	40	190	70	150	50
92302	1	170	60	210	80	160	70
92302	2	130	40	170	60	110	40
92303	1	200	60	250	100	210	70
92303	2	150	40	190	90	150	80
92304	1	120	80	140	90	100	50
92304	2	130	10	120	60	100	20
92501	1	160	50	180	70	150	50
92501	2	120	40	170	70	140	50
92801	1	150	40	200	80	140	40
92801	2	140	20	200	60	110	30
92802	1	140	30	220	70	120	40
92802	2	120	30	170	40	110	30

DEC = DECREASE

TABLE 5.6-6 FTP (GRAMS PER TEST PERIOD)

	COLD TRANSIENT				COLD STABILIZED				HOT TRANSIENT			
	HC	CO	CO2	NOXC	HC	CO	CO2	NOXC	HC	CO	CO2	NOXC
09901 1	2.82	62.10	1670.7	6.50	.10	.01	2007.6	5.93	.33	2.64	1237.3	6.46
09901 2	3.68	61.97	1711.7	5.51	.10	.36	2014.4	5.51	.30	1.63	1553.0	6.55
09902 1	3.46	39.62	1579.9	7.85	.14	.29	1871.6	6.50	.20	.18	1437.3	8.86
09902 2	2.11	35.58	1709.0	7.94	.15	.01	2038.5	6.43	.25	2.32	1547.2	9.46
09903 1	2.24	60.49	1782.4	6.42	.07	.06	2101.0	5.15	.17	.34	1555.7	6.91
09903 2	4.09	57.83	1762.7	5.74	.08	.05	2057.3	5.03	.17	1.06	1527.4	6.77
92301 1	9.07	176.37	1978.9	10.35	.71	4.95	2142.6	5.32	1.35	11.66	1703.2	5.61
92301 2	7.85	160.73	1850.1	8.71	.67	3.49	2129.4	6.06	1.12	10.01	1763.8	7.21
92302 1	6.98	133.01	2169.8	6.98	.38	1.14	2323.8	4.53	1.01	25.36	1898.1	5.10
92302 2	6.60	132.15	2168.8	6.86	.41	1.23	2311.5	4.96	1.42	29.31	1862.2	5.80
92303 1	6.10	114.02	2143.1	7.26	.39	2.14	2243.8	5.49	1.26	17.68	1835.3	5.57
92303 2	5.99	117.75	2237.3	6.99	.37	.44	2281.9	5.31	1.09	26.79	1887.0	5.92
92304 1	8.32	141.46	1999.9	6.50	.75	2.16	2205.4	2.59	3.32	21.80	1827.5	3.24
92304 2	8.07	130.86	2054.4	4.71	.74	2.41	2193.3	2.83	1.25	15.55	1848.5	3.14
92501 1	6.88	86.33	2023.6	10.91	.55	1.09	2081.1	8.66	.85	8.39	1761.1	11.48
92501 2	7.56	111.12	1899.9	9.27	.59	1.39	2059.8	8.76	1.07	7.75	1758.6	11.50
92801 1	6.71	70.16	1777.6	7.69	.56	2.06	1858.5	4.08	1.38	22.66	1531.6	6.02
92801 2	6.13	59.60	1812.5	7.95	.59	1.76	1892.0	4.09	1.42	21.80	1558.8	6.63
92802 1	7.26	91.96	1828.3	10.50	.55	.25	1906.4	4.79	1.15	10.86	1587.0	8.34
92802 2	6.57	97.16	1853.6	9.25	.54	.13	1915.9	4.84	1.11	13.57	1585.9	8.21

TEST GROUP NO. 8 REPORT

5.7 TEST GROUP NO. 8 - EVALUATION OF POTENTIAL CATALYST DIAGNOSTIC TESTS

5.7.1 SUMMARY

The intent of this test group was to provide test data to be used to evaluate the ability of various catalyst diagnostic tests to diagnose "poisoned" catalysts.

The poisoning of the catalyst was accomplished by accumulating mileage using tankfuls of leaded fuel. After repeated tankfuls of leaded fuel were consumed, mileage was accumulated using tankfuls of unleaded fuel to provide data for evaluation of the rejuvenation process of the catalytic converter.

Two 1980 Chevrolet Citations and one 1979 Chevrolet Caprice were selected from the loaner fleet of vehicles for this test group.

A baseline FTP and two Hot Start FTP's (one using Indolene HO and one using commercial premium fuel) were performed prior to the start of the mileage accumulation. After each tank of fuel was consumed, the vehicles were subjected to a Hot Start FTP followed by a 50 MPH Cruise, Two-Mode, and two Four-Mode Tests. The second Four-Mode test was conducted with one spark plug disconnected. Exhaust emission measurements (HC, CO, and NO_x) for each of the short tests were taken at a point in front of the catalytic converter in addition to the tailpipe measurement. A special propane diagnostic check was also performed as part of each test sequence.

All testing was conducted in the same test cell. The analyzers of both test cells were used for the dual measurement (before and after catalytic converter) required for the short tests.

Upon conclusion of the mileage accumulation tests, a final FTP was performed.

5.7.2 VEHICLE SELECTION

Three vehicles were selected from the loaner fleet of vehicles for this test. The vehicles selected were as follows:

EPA NO.	MODEL YEAR	MAKE	MODEL	VEH. IDENT. NO.	ENGINE	CYL.
09904	1980	Chev	Citation	1X687A6251551	173-2V	6
09906	1980	Chev	Citation	1X687A6251172	173-2V	6
92305	1979	Chev	Caprice	1N69G9C176121	305-2V	8

The vehicles were equipped with automatic transmissions, air conditioners, catalytic converters, EGR, and electronic ignitions. The Citations were also equipped with an air injection system.

5.7.3 TEST PROCEDURES

5.7.3.1 Test Sequencing

The initial test performed on each of the vehicles was the Federal Test Procedure (FTP) (Ref. para. 4.3.3 and 4.3.4).

The vehicles were then subjected to a series of test sequences. Each test sequence consisted of the following tests:

- Hot Start FTP (Ref. para. 5.7.3.2)
- 50 MPH Cruise Test (Ref. para. 4.3.8)
- Four Mode Test (Ref. para. 4.3.9)
- Four Mode Test with one spark plug disabled
- Two Mode Test (Ref. para. 4.3.7)
- Propane Diagnostic Test (Ref. para. 5.7.3.4)
- 2nd Hot Start FTP

The series of test sequences performed on each of the three vehicles consisted of a baseline test with Indolene HO unleaded fuel, a baseline test with commercial leaded fuel, and then repeated tests after tankfuls of leaded or unleaded fuel were consumed. The number of repeated tests varied for each of the vehicles and was as follows:

EPA NO. 09904 - 8 Test Sequences (four tanks of leaded and four tanks of unleaded)

EPA NO. 09906 - 9 Test Sequences (four tanks of leaded and five tanks of unleaded)

EPA NO. 92305 - 12 Test Sequences (eight tanks of leaded and four tanks of unleaded)

Upon completion of the series of tests a final FTP was performed.

5.7.3.2 Hot Start FTP

The Hot Start FTP was performed similar to the normal FTP (Ref. para. 4.3.4) except the emissions were collected only during the first two phases (transient and stabilized).

The initial Hot Start FTP preconditioning for each of the test sequences consisted of filling the tank with the appropriate fuel and driving the vehicle on the dynamometer the 7.5 mile cycle.

5.7.3.3 Propane Diagnostic Test

This test was conducted in accordance with the following procedure:

- Disconnect PCV fresh air inlet from air cleaner.
- Record idle HC and CO emission levels and RPM.
- Insert propane supply tube into air cleaner air inlet.
- Adjust needle valve on propane supply to cause a 25 to 50 RPM change in engine speed. Record emission levels and RPM.
- Increase amount of propane supplied to cause another 25 to 50 RPM change in engine speed. Record emission levels and RPM.
- When a maximum is reached record emission levels and RPM at that point also.
- Continue increasing amount of propane supplied in 25 to 50 RPM steps until engine speed is 150 RPM below original speed or engine stalls. Record emission levels and RPM for each step.
- Remove propane supply tube and reconnect PCV fresh air inlet.

5.7.3.4 Short Test Measurements

The undiluted exhaust emissions (HC, CO and NO_x) were measured at a point in front of the catalytic converter in addition to the tailpipe measurement for the 50 MPH Cruise, Two Mode and the two Four Mode Tests. Each of the three vehicles was modified by the addition of a sampling tap in front of the catalytic converter. By using the analyzers in both test cells, simultaneous measurements from the two points were made.

5.7.3.5 Inertia Weights and Horsepower Settings

The inertia weights and horsepower settings used for the FTP and the Hot Start FTP tests were as follows:

	Inertia Wt.	Act. HP Setting
Citation	3000	7.3
Caprice	4000	13.3

5.7.3.6 Leaded Fuel

The leaded fuel used for the tests was Union 76 Premium which was obtained locally. The fuel was purchased in two batches and a lead content analysis of a sample of the batches was made. The lead content was 1.14 grams per gallon for the first batch (160 gallons) and 1.48 grams per gallon for the second (100 gallons).

5.7.4 TEST RESULTS

The initial and final Federal Test Procedure (FTP) test results for the three vehicles tested are shown on Table 5.7-1.

The test results for the Hot Start FTP (HSFTP) and the various short tests are provided in the following tables:

Table 5.7-2 - EPA NO. 09904 Hot Start FTP
Table 5.7-3 - EPA NO. 09906 Hot Start FTP
Table 5.7-4 - EPA NO. 92305 Hot Start FTP
Table 5.7-5 - EPA NO. 09904 Two Mode & 50 MPH Cruise Tests
Table 5.7-6 - EPA NO. 09906 Two Mode & 50 MPH Cruise Tests
Table 5.7-7 - EPA NO. 92305 Two Mode & 50 MPH Cruise Tests
Table 5.7-8 - EPA NO. 09904 Four Mode Test
Table 5.7-9 - EPA NO. 09906 Four Mode Test
Table 5.7-10 - EPA NO. 92305 Four Mode Test
Table 5.7-11 - EPA NO. 09904 Four Mode Test (Spark Plug Disabled)
Table 5.7-12 - EPA NO. 09906 Four Mode Test (Spark Plug Disabled)
Table 5.7-13 - EPA NO. 92305 Four Mode Test (Spark Plug Disabled)
Table 5.7-14 - EPA NO. 09904 Propane Injection Test
Table 5.7-15 - EPA NO. 09906 Propane Injection Test
Table 5.7-16 - EPA NO. 92305 Propane Injection Test

The mileage accumulated and fuel usage for each of the test sequences are shown on Table 5.7-17. It should be noted that no set pattern was followed during the mileage accumulation; thus, the calculated and composite MPG results are not meaningful for comparison purposes.

Test L6-2 (2nd Hot Start Test after the sixth leaded tankful) on Table 5.7-4 was inadvertently performed with an inertia weight setting of 1750 lbs.

The legends for the tables are as follows:

Legend for Tables 5.7-2 through 5.7-14

Test:
- BI - Baseline Indolene Fuel
- BL - Baseline Leaded Fuel
- L - Leaded Fuel
- U - Unleaded Fuel
- -1 - 1st Hot Start FTP of test sequence
- -2 - 2nd Hot Start FTP of test sequence

HOT TRANSIENT & HOT STABILIZED:

- Hydrocarbons (HC), carbon monoxide (CO), carbon dioxide (CO_2) and oxides of nitrogen corrected for humidity (NOX_C) are presented in grams per test phase.

COMPOSITE:

- HC, CO, CO_2, and NOX_C results are a composite of the transient and stabilized portions of the FTP and are presented in grams per mile.
- MPG (miles per gallon) results are calculated by the Carbon Balance method.

Legend for Tables 5.7-5 through 5.7-13

- BI - Baseline Indolene Fuel
- BL - Baseline Leaded Fuel
- L - Leaded Fuel
- U - Unleaded Fuel (Indolene)
- -1 - Measurement taken at tailpipe
- -2 - Measurement taken before catalyst
- HC - Hydrocarbons in ppm (Measurements are in hexane for all readings except for "LAB" readings which are in total hydrocarbons.)
- CO - Carbon Monoxide in Percent
- NO_X - Oxides of Nitrogen in ppm
- LAB - Laboratory Analyzers
- GARAGE - EPA-75 Garage Analyzer

TABLE 5.7-1 FTP TEST RESULTS

EPA NO.		HC	CO	CO_2	NOX_c	MPG
09904	CT (grams)	3.93	44.70	1697.9	7.82	****
Initial	CS (grams)	0.07	0.04	2129.8	6.30	****
	HT (grams)	0.43	3.07	1628.1	8.28	****
	COMP/GPM	0.27	2.80	505.1	1.92	17.4
	CT (grams)	2.63	45.27	1823.9	5.80	****
Final	CS (grams)	0.90	0.04	2070.0	4.59	****
	HT (grams)	1.00	0.98	1560.8	5.90	****
	COMP/GPM	0.35	2.68	499.2	1.39	17.6
09906	CT (grams)	3.88	76.46	1847.5	5.24	****
Initial	CS (grams)	0.18	0.00	2172.0	5.42	****
	HT (grams)	0.41	3.10	1644.1	6.55	****
	COMP/GPM	0.28	4.62	520.5	1.52	16.8
	CT (grams)	4.06	57.12	1731.7	6.34	****
Final	CS (grams)	3.00	0.12	2020.0	5.21	****
	HT (grams)	2.05	0.76	1513.8	6.19	****
	COMP/GPM	0.79	3.35	483.7	1.53	18.0
92305	CT (grams)	8.55	137.61	2046.7	7.56	****
Initial	CS (grams)	0.45	2.08	2212.1	5.48	****
	HT (grams)	2.00	27.58	1826.3	6.01	****
	COMP/GPM	0.70	10.26	551.1	1.62	15.6
	CT (grams)	9.23	129.69	2135.8	9.34	****
Final	CS (grams)	2.40	2.99	2205.4	4.88	****
	HT (grams)	2.83	25.03	1829.5	6.79	****
	COMP/GPM	1.06	9.74	555.5	1.70	15.4

Legend:

CT - Cold Transient
CS - Cold Stabilized
HT - Hot Transient
COMP/GPM - Composite results in grams per mile

TABLE 5.7-2 EPA NO. 09904 HOT START FTP

	HOT TRANSIENT				HOT STABILIZED				COMPOSITE				
TEST	HC	CO	CO2	NOXC	HC	CO	CO2	NOXC	HC	CO	CO2	NOXC	MPG
BI-1	.77	.81	1595.2	7.71	.20	.00	2085.4	4.20	.13	.11	490.8	1.59	18.0
BI-2	.58	9.91	1663.6	5.20	.21	1.63	2196.4	2.60	.07	1.54	514.7	1.04	17.1
BL-1	.70	3.80	1637.4	9.48	.48	.00	2176.2	5.55	.16	.51	508.5	2.00	17.4
BL-2	.28	11.90	1625.6	4.40	.30	52.85	2160.7	1.70	.08	8.63	504.8	.81	17.1
L1-1	1.17	2.92	1697.9	10.72	1.05	1.14	2215.7	8.82	.30	.54	521.8	2.61	16.9
L1-2	.58	1.04	1668.8	8.40	.75	.03	2070.3	6.15	.18	.14	498.5	1.94	17.8
L2-1	1.12	4.91	1586.8	8.68	1.09	.60	2057.1	6.56	.29	.73	485.8	2.03	18.2
L2-2	1.33	86.77	1667.3	2.20	2.92	166.36	2196.3	1.16	.57	33.75	515.1	.45	15.6
L3-1	1.55	2.75	1669.7	8.70	1.35	1.87	2021.2	5.22	.39	.62	492.1	1.86	17.9
L3-2	1.37	31.86	1653.2	3.14	3.06	108.40	2142.7	1.42	.59	18.70	506.1	.61	16.5
L4-1	2.13	16.85	1615.7	8.06	2.17	29.11	2187.6	3.50	.57	6.13	507.1	1.54	17.1
L4-2	4.32	171.83	1581.6	1.72	7.25	279.14	2169.4	1.01	1.54	60.13	500.1	.36	14.8
U1-1	1.07	10.27	1751.2	7.30	1.18	.31	2313.0	7.07	.30	1.41	541.9	1.92	16.3
U1-2	1.26	7.46	1670.9	6.41	1.34	1.17	2137.2	3.18	.35	1.15	507.8	1.28	17.4
U2-1	.97	2.56	1584.4	6.33	1.01	.04	2037.4	5.23	.26	.35	482.9	1.54	18.3
U2-2	1.03	3.46	1576.1	6.05	1.09	.03	2020.1	4.57	.28	.47	479.5	1.42	18.4
U3-1	.84	5.54	1593.9	5.91	.87	.03	2032.1	5.05	.23	.74	483.5	1.46	18.3
U3-2	.89	.46	1531.2	5.78	1.03	.03	2016.1	4.50	.26	.07	473.0	1.37	18.7
U4-1	.85	4.45	1627.3	6.02	.85	.01	2056.6	5.01	.23	.59	491.2	1.47	18.0
U4-2	.95	3.11	1647.8	6.07	.97	.00	2062.3	4.42	.26	.42	494.7	1.40	17.9

TABLE 5.7-3 EPA NO. 09906 HOT START FTP

	HOT TRANSIENT				HOT STABILIZED				COMPOSITE				
TEST	HC	CO	CO2	NOXC	HC	CO	CO2	NOXC	HC	CO	CO2	NOXC	MPG
BI-1	.23	1.77	1639.2	6.11	.25	.06	2089.2	4.10	.06	.25	497.1	1.36	17.8
BI-2	.26	1.34	1603.6	6.18	.13	.07	2098.3	3.67	.05	.19	493.6	1.31	17.9
BL-1	.73	2.47	1635.6	6.87	.66	.09	2053.7	5.41	.19	.34	491.9	1.64	18.0
BL-2	.49	2.93	1566.8	3.52	.34	21.45	2008.6	1.45	.11	3.25	476.7	.66	18.4
L1-1	1.17	1.76	1556.9	7.05	.87	.21	1960.4	5.66	.27	.26	469.0	1.70	18.9
L1-2	.94	19.00	1670.0	4.73	.71	7.48	2140.8	2.58	.22	3.53	508.1	.97	17.2
L2-1	1.46	2.32	1593.8	6.76	1.06	.44	2000.0	5.39	.34	.37	479.2	1.62	18.4
L2-2	1.23	6.01	1624.4	6.40	1.19	5.56	2106.9	3.14	.32	1.54	497.5	1.27	17.7
L3-1	1.60	5.58	1813.4	9.02	1.67	1.33	2268.3	7.56	.44	.92	544.2	2.21	16.2
L3-2	1.59	4.47	1775.4	8.63	1.65	1.38	2218.6	6.89	.43	.78	532.5	2.07	16.6
L4-1	1.54	6.00	1575.7	6.66	1.64	2.62	1967.9	5.70	.42	1.15	472.5	1.65	18.6
L4-2	1.88	6.34	1549.3	6.55	1.93	9.51	1983.8	3.86	.51	2.11	471.1	1.39	18.6
U1-1	1.41	5.68	1724.3	7.27	1.33	.34	2079.2	5.71	.37	.80	507.1	1.73	17.4
U1-2	1.54	8.61	1603.1	6.24	1.63	1.10	2031.7	3.90	.42	1.29	484.6	1.35	18.2
U2-1	1.17	1.31	1580.3	5.95	1.10	.05	2021.9	4.79	.30	.18	480.3	1.43	18.4
U2-2	1.70	6.61	1559.6	6.43	1.59	.45	1976.3	4.12	.44	.94	471.5	1.41	18.7
U3-1	1.20	4.29	1564.7	7.24	1.07	.09	1972.3	5.58	.30	.58	471.6	1.71	18.7
U3-2	1.62	3.13	1566.2	5.98	1.18	.01	1972.7	4.76	.37	.42	471.9	1.43	18.7
U4-1	1.61	26.65	1763.4	7.46	1.20	.01	2166.1	6.38	.37	3.56	523.9	1.85	16.7
U4-2	1.44	3.47	1692.8	7.70	1.45	.13	2123.9	6.00	.39	.48	508.9	1.83	17.4
U5-1	2.26	1.76	1568.2	6.29	1.90	.01	1973.0	5.16	.55	.24	472.2	1.53	18.7
U5-2	1.60	2.40	1530.6	7.18	1.46	.36	1965.7	4.24	.41	.37	466.2	1.52	18.9

TABLE 5.7-4 EPA NO. 92305 HOT START FTP

	HOT TRANSIENT				HOT STABILIZED				COMPOSITE				
TEST	HC	CO	CO2	NOXC	HC	CO	CO2	NOXC	HC	CO	CO2	NOXC	MPG
BI-1	1.12	24.14	1760.8	5.30	.33	.44	2120.6	4.33	.19	3.28	517.5	1.28	16.9
BI-2	1.06	14.92	1721.1	4.90	.34	.02	2078.6	3.88	.19	1.99	506.6	1.17	17.4
BL-1	2.18	17.91	1813.3	5.83	2.02	.68	2100.1	4.18	.56	2.48	521.8	1.34	16.8
BL-2	1.89	12.66	1785.4	5.54	1.97	.66	2105.2	3.95	.51	1.78	518.7	1.26	17.0
L1-1	2.86	23.67	1827.9	5.55	2.51	1.47	2146.6	3.72	.72	3.35	529.9	1.24	16.5
L1-2	2.65	15.26	1815.9	5.90	2.59	1.65	2110.6	3.76	.70	2.26	523.5	1.29	16.8
L2-1	3.05	20.37	1850.7	6.47	2.65	1.17	2121.5	4.10	.76	2.87	529.6	1.41	16.5
L2-2	2.95	20.08	1812.5	5.73	2.79	1.47	2100.8	3.84	.77	2.87	521.8	1.28	16.8
L3-1	2.81	18.93	1864.6	6.19	3.19	1.34	2133.6	3.39	.80	2.70	533.1	1.28	16.4
L3-2	3.24	18.71	1829.6	6.43	3.21	1.61	2124.3	3.72	.86	2.71	527.2	1.35	16.6
L4-1	2.97	25.97	1914.1	6.93	3.14	.71	2151.7	3.79	.81	3.56	542.1	1.43	16.1
L4-2	2.99	19.09	1782.7	6.60	3.43	.94	2109.9	3.75	.86	2.67	519.0	1.38	16.9
L5-1	3.04	15.01	1820.4	6.74	3.32	.88	2101.3	3.63	.85	2.12	522.9	1.38	16.8
L5-2	3.44	13.08	1830.5	6.93	3.45	1.23	2092.5	3.85	.92	1.91	523.1	1.44	16.8
L6-1	3.41	30.44	1867.7	5.96	3.57	1.19	2168.5	4.09	.93	4.22	538.2	1.34	16.2
L6-2	3.20	4.65	1575.8	4.89	3.31	1.30	1819.7	2.79	.87	.79	452.7	1.02	19.4
L7-1	3.24	18.08	1843.9	6.59	3.92	.90	2103.3	3.55	.95	2.53	526.3	1.35	16.6
L7-2	4.27	15.53	1860.6	7.17	4.05	1.04	2122.2	3.27	1.11	2.21	531.0	1.39	16.5
L8-1	3.55	22.63	1877.2	5.58	3.77	.76	2128.6	3.33	.98	3.12	534.1	1.19	16.4
L8-2	3.94	23.18	1949.9	6.44	4.10	.95	2151.2	3.26	1.07	3.22	546.8	1.29	16.0
U1-1	2.90	21.33	1858.3	5.09	3.03	.28	2133.8	3.16	.79	2.88	532.3	1.10	16.4
U1-2	3.08	19.09	1861.4	6.09	2.86	.38	2123.5	3.71	.79	2.60	531.3	1.31	16.5
U2-1	2.91	20.81	1860.0	5.28	3.03	.42	2147.6	3.02	.79	2.83	534.3	1.11	16.4
U2-2	3.19	22.79	1849.2	5.24	3.28	.41	2120.1	3.34	.86	3.09	529.2	1.15	16.5
U3-1	3.39	22.03	1833.1	4.94	3.20	.48	2161.2	3.41	.88	3.00	532.6	1.11	16.4
U3-2	3.30	26.51	1862.2	5.61	3.09	.67	2122.3	3.40	.85	3.62	531.3	1.20	16.4
U4-1	3.47	29.85	1856.7	5.42	2.84	.38	2161.7	3.80	.84	4.03	535.8	1.23	16.3
U4-2	3.14	29.52	1915.3	5.80	2.52	2.17	2183.6	4.49	.75	4.23	546.5	1.37	16.0

TABLE 5.7-5 EPA NO. 09904 TWO MODE & 50MPH CRUISE TESTS

* NORMAL EMISSIONS MEASUREMENT *

	--TWO MODE (30MPH)--					---TWO MODE (IDLE)--					-----50MPH CRUISE----				
	-----LAB-----			GARAGE		-----LAB----			GARAGE		-----LAB-----			GARAGE	
TEST	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO
BI-1	44	.0	241	0	.0	4	.0	106	0	.0	93	.0	647	10	.0
BL-1	35	.0	71	10	.0	4	.0	89	10	.0	154	.0	624	40	.0
L1-1	75	.2	64	20	.1	7	.0	141	20	.0	218	.0	878	70	.0
L2-1	270	.1	99	10	.1	7	.0	76	0	.0	341	.0	672	20	.0
L3-1	754	.3	106	50	.3	72	.0	84	0	.0	350	.0	535	20	.0
L4-1	742	1.0	51	40	1.0	62	.0	79	0	.0	540	.4	221	20	.4
U1-1	399	.0	535	40	.0	172	.0	163	20	.0	200	.0	609	20	.0
U2-1	301	.0	567	30	.0	212	.0	89	20	.0	185	.0	510	30	.0
U3-1	246	.0	535	20	.0	203	.0	86	10	.0	172	.0	480	30	.0
U4-1	313	.0	535	20	.0	218	.0	91	20	.0	172	.0	465	20	.0

* BEFORE CATALYST EMISSIONS MEASUREMENT *

BI-2	2390	2.6	284	170	3.2	1473	.8	98	90	.9	1482	.6	668	100	.7
BL-2	2286	4.9	115	150	4.8	1136	.8	85	50	.8	1675	.8	633	100	.9
L1-2	2549	4.7	165	170	4.3	1626	1.4	140	80	1.3	1289	.1	932	60	.2
L2-2	2553	4.8	115	170	4.6	1549	.9	73	90	.9	1589	.4	685	80	.4
L3-2	1987	4.1	122	130	3.8	1008	.5	88	50	.7	1289	.2	566	70	.2
L4-2	2724	5.6	100	180	5.5	1344	.8	88	70	.9	1828	3.1	259	110	3.1
U1-2	1048	.7	526	60	.8	824	1.0	160	40	1.1	678	.1	658	40	.2
U2-2	2415	.2	563	160	.2	1629	1.0	88	100	1.0	711	.1	521	40	.1
U3-2	1320	1.5	297	60	.8	1170	1.2	102	60	1.2	925	.2	454	60	.2
U4-2	885	.2	538	40	.3	1020	1.1	80	60	1.0	812	.2	449	50	.2

TABLE 5.7-6 EPA NO. 09906 TWO MODE & 50MPH CRUISE TESTS

* NORMAL EMISSIONS MEASUREMENT *

	--TWO MODE (30MPH)--					---TWO MODE (IDLE)--					----50MPH CRUISE----				
	-----LAB----			GARAGE		-----LAB----			GARAGE		-----LAB----			GARAGE	
TEST	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO
BI-1	44	.0	400	10	.0	16	.0	111	10	.0	47	.0	510	20	.0
BL-1	295	.0	206	20	.0	16	.0	106	10	.0	157	.0	505	20	.0
L1-1	408	.0	255	40	.0	50	.0	86	10	.0	264	.0	510	30	.0
L2-1	739	.0	510	60	.1	145	.0	89	20	.0	301	.0	437	40	.0
L3-1	885	.1	285	90	.1	264	.0	79	40	.0	451	.0	629	40	.0
L4-1	836	.0	589	40	.1	277	.0	99	20	.0	368	.0	542	20	.0
U1-1	500	.0	485	60	.0	166	.0	86	40	.0	197	.0	355	40	.0
U2-1	509	.0	500	60	.0	215	.0	86	30	.0	203	.0	343	30	.0
U3-1	475	.0	647	60	.0	179	.0	118	30	.0	212	.0	510	10	.0
U4-1	423	.0	696	50	.0	130	.0	91	20	.0	252	.0	462	50	.0
U5-1	472	.0	485	290	.0	142	.0	89	140	.0	172	.0	420	20	.0
* BEFORE CATALYST EMISSIONS MEASUREMENT *															
BI-2	2873	.3	459	190	.2	1690	.7	110	100	.7	870	.1	516	50	.1
BL-2	3373	2.4	190	220	2.6	1825	.3	122	120	.3	757	.1	548	40	.1
L1-2	3793	2.0	252	200	2.0	1500	.2	85	70	.2	898	.1	526	50	.1
L2-2	1488	.6	563	80	.7	760	.2	90	40	.2	1222	.1	478	70	.1
L3-2	7574	2.3	284	480	2.0	5414	.2	90	350	.2	1405	.1	658	80	.1
L4-2	1167	.4	546	60	.2	650	.3	112	30	.2	797	.1	588	40	.1
U1-2	1274	.3	483	70	.4	803	.6	90	40	.6	754	.1	379	40	.1
U2-2	2476	.2	513	190	.2	1338	.4	80	90	.4	1045	.1	366	70	.1
U3-2	2993	.3	618	200	.2	1537	.4	102	100	.4	769	.1	533	50	.1
U4-2	1855	.1	725	100	.1	1090	.4	90	50	.4	1262	.1	269	70	.1
U5-2	1580	.3	543	110	.1	925	.5	90	60	.5	1032	.1	444	70	.1

TABLE 5.7-7 EPA NO. 92305 TWO MODE & 50MPH CRUISE TESTS

* NORMAL EMISSIONS MEASUREMENT *

	--TWO MODE (30MPH)--					---TWO MODE (IDLE)--					-----50MPH CRUISE----				
	-----LAB----			GARAGE		-----LAB----			GARAGE		-----LAB----			GARAGE	
TEST	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO
BI-1	93	.0	183	10	.0	72	.0	79	10	.0	56	.0	447	20	.0
BL-1	454	.0	251	60	.0	852	.0	51	120	.0	325	.0	410	40	.0
L1-1	540	.0	206	60	.0	791	.0	61	90	.0	396	.0	350	60	.0
L2-1	607	.0	236	40	.0	821	.0	64	90	.0	469	.0	455	50	.0
L3-1	735	.0	251	60	.0	748	.0	61	70	.0	478	.0	480	40	.0
L4-1	760	.0	216	70	.0	882	.0	51	100	.0	497	.0	597	60	.0
L5-1	934	.0	338	60	.0	1090	.0	54	90	.0	601	.0	574	50	.0
L6-1	855	.0	188	80	.0	1041	.0	44	150	.0	616	.0	470	70	.0
L7-1	1090	.0	248	80	.0	1249	.0	49	130	.0	586	.0	487	50	.1
L8-1	873	.0	201	60	.0	974	.0	51	80	.0	616	.0	388	30	.0
U1-1	671	.0	188	200	.0	668	.0	71	140	.0	491	.0	435	40	.0
U2-1	619	.0	176	50	.0	699	.0	56	70	.0	579	.0	425	50	.0
U3-1	567	.0	178	40	.0	515	.0	64	40	.0	567	.0	435	40	.0
U4-1	182	.0	146	80	.0	185	.0	81	80	.0	439	.0	410	80	.0
* BEFORE CATALYST EMISSIONS MEASUREMENT *															
BI-2	1656	.1	197	100	.1	2155	.1	73	180	.1	916	.1	50	60	.1
BL-2	1929	.1	252	110	.1	2893	.1	55	200	.1	1262	.1	426	70	.1
L1-2	2381	.1	190	130	.1	2993	.1	58	220	.1	1620	.1	329	90	.1
L2-2	2283	.1	259	150	.1	3663	.1	75	320	.1	1549	.1	471	90	.1
L3-2	2094	.1	262	140	.1	3273	.1	65	180	.1	1259	.1	469	70	.0
L4-2	2293	.1	227	150	.1	3213	.1	65	220	.1	1436	.1	578	100	.1
L5-2	1595	.1	379	100	.1	3443	.1	98	180	.2	1155	.1	588	60	.1
L6-2	1534	.1	205	90	.1	2993	.1	53	230	.1	1301	.1	469	60	.1
L7-2	3173	.1	257	200	.1	4123	.1	45	320	.1	1681	.1	491	90	.1
L8-2	3213	.1	217	180	.1	3293	.0	150	220	.1	1136	.1	391	60	.1
U1-2	3193	.1	160	190	.1	3423	.1	40	200	.1	1029	.1	414	50	.1
U2-2	2406	.1	187	170	.1	3793	.1	50	320	.1	4393	.1	419	220	.1
U3-2	1870	.1	190	110	.1	2384	.2	55	170	.2	1139	.1	466	60	.1
U4-2	2733	.1	155	180	.1	3293	.2	60	240	.2	1308	.1	394	90	.1

TABLE 5.7-8 EPA NO. 09904 FOUR MODE TEST

* NORMAL EMISSIONS MEASUREMENT *

	IDLE NEUTRAL					2500 RPM					IDLE NEUTRAL					IDLE IN GEAR				
	LAB			GARAGE		LAB			GARAGE		LAB			GARAGE		LAB			GARAGE	
TEST	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO
BI-1	53	.0	74	0	.0	1311	3.1	34	40	3.1	20	.0	76	0	.0	13	.0	99	0	.0
BL-1	166	.0	81	30	.0	3069	6.7	31	160	6.4	102	.0	84	20	.0	68	.0	120	20	.0
L1-1	142	.0	106	40	.0	374	2.1	36	80	1.2	38	.0	148	30	.0	44	.0	233	30	.0
L2-1	154	.0	69	10	.0	1923	4.3	36	40	4.6	68	.0	76	0	.0	81	.0	111	0	.0
L3-1	231	.0	74	20	.0	463	.6	24	20	.8	130	.0	84	0	.0	139	.0	94	0	.0
L4-1	142	.0	86	10	.0	4380	7.2	26	200	7.0	218	.0	79	10	.1	145	.0	101	0	.0
U1-1	179	.0	118	20	.0	350	.1	69	20	.2	157	.0	128	10	.0	212	.0	206	20	.0
U2-1	206	.0	61	30	.0	277	.0	111	30	.0	182	.0	71	30	.0	228	.0	79	30	.0
U3-1	188	.0	69	30	.0	212	.0	111	30	.0	176	.0	74	20	.0	203	.0	91	30	.0
U4-1	185	.0	81	10	.0	154	.0	111	10	.0	154	.0	81	10	.0	166	.0	101	10	.0

* BEFORE CATALYST EMISSIONS MEASUREMENT *

BI-2	986	.9	70	50	.9	2286	4.4	90	100	4.2	1060	1.0	83	50	1.0	1384	1.1	117	80	1.0
BL-2	1063	.7	83	60	.7	4063	7.2	75	190	7.2	1185	.8	90	60	.8	1323	.7	140	80	.7
L1-2	1727	1.6	107	100	1.4	2643	4.4	95	140	4.4	1418	1.4	145	80	1.3	1503	1.4	227	90	1.2
L2-2	1112	.6	68	60	.6	3053	5.0	85	120	4.8	1142	.7	78	60	.7	1335	.6	117	90	.6
L3-2	769	.6	73	40	.6	1558	2.2	105	60	2.5	937	.6	88	50	.6	1145	.6	115	60	.6
L4-2	733	.4	85	40	.4	5294	8.1	63	230	8.2	879	.5	85	50	.6	1081	.6	132	60	.6
U1-2	895	.8	155	50	.8	956	1.2	112	40	1.2	885	.9	150	40	.8	1161	1.0	227	60	.9
U2-2	986	1.0	63	50	.9	922	1.1	115	40	1.2	956	.9	80	50	.9	1234	1.1	90	60	1.0
U3-2	1130	.9	73	60	.9	785	1.0	110	40	.1	1032	1.0	78	50	.9	1259	1.0	100	60	.9
U4-2	928	.7	80	60	.6	622	.7	102	40	.7	846	.5	83	50	.6	1017	.5	107	60	.5

TABLE 5.7-9 EPA NO. 09906 FOUR MODE TEST

* NORMAL EMISSIONS MEASUREMENT *

	IDLE NEUTRAL					2500 RPM					IDLE NEUTRAL					IDLE IN GEAR				
	LAB			GARAGE		LAB			GARAGE		LAB			GARAGE		LAB			GARAGE	
TEST	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO
BI-1	20	.0	11	10	.0	179	.0	89	10	.0	26	.0	81	10	.0	23	.0	99	10	.0
BL-1	75	.0	79	10	.0	304	1.2	9	20	1.1	29	.0	86	10	.0	29	.0	118	10	.0
L1-1	90	.0	79	10	.0	399	.2	36	30	.1	53	.0	84	10	.0	68	.0	106	10	.0
L2-1	114	.0	74	20	.0	509	.3	46	30	.4	96	.0	84	20	.0	127	.0	99	20	.0
L3-1	157	.0	79	20	.0	852	1.6	11	60	1.6	96	.0	81	10	.0	93	.0	96	10	.0
L4-1	200	.0	81	10	.0	662	.6	56	40	.9	163	.0	79	10	.0	203	.0	111	10	.0
U1-1	130	.0	66	40	.0	332	.1	86	60	.0	108	.0	71	50	.0	133	.0	96	60	.0
U2-1	127	.0	74	40	.0	399	.0	104	60	.0	124	.0	76	40	.0	133	.0	91	40	.0
U3-1	108	.0	76	0	.0	325	.0	121	10	.0	93	.0	81	0	.0	124	.0	113	0	.0
U4-1	114	.0	79	20	.0	301	.0	111	40	.1	105	.0	76	20	.0	136	.0	101	30	.0
U5-1	882	.0	81	140	.0	339	.0	104	30	.0	108	.0	79	10	.0	371	.0	113	50	.0

* BEFORE CATALYST EMISSIONS MEASUREMENT *

BI-2	9595	.0	18	1400	.0	1742	2.1	85	90	2.6	864	.5	93	40	.5	1054	.6	110	60	.6
BL-2	570	.1	90	30	.2	1610	2.6	100	70	2.8	662	.2	102	40	.2	772	.1	140	40	.2
L1-2	558	.1	90	20	.1	1589	1.9	95	60	2.0	635	.2	90	40	.2	730	.1	127	40	.2
L2-2	818	.1	80	40	.2	1191	1.4	110	60	1.5	772	.2	88	40	.2	818	.1	105	50	.2
L3-2	769	.1	80	30	.1	1812	2.6	95	80	3.0	723	.2	100	40	.2	806	.2	110	40	.2
L4-2	601	.3	102	20	.2	1305	1.9	112	60	1.8	641	.3	93	20	.2	782	.2	140	40	.2
U1-2	711	.4	83	30	.4	962	1.0	90	40	1.2	711	.4	75	30	.4	864	.5	100	40	.4
U2-2	699	.4	68	40	.3	901	.9	93	40	1.1	699	.4	78	40	.4	840	.4	107	40	.4
U3-2	534	.3	80	20	.3	947	1.2	125	20	.8	567	.3	90	20	.3	815	.4	127	40	.4
U4-2	870	.3	85	40	.3	1185	1.2	112	50	1.1	726	.4	85	30	.4	895	.4	120	40	.4
U5-2	2413	.4	93	280	.4	1090	.5	110	60	.5	702	.4	85	60	.4	1360	.5	127	70	.6

TABLE 5.7-10 EPA NO. 92305 FOUR MODE TEST

* NORMAL EMISSIONS MEASUREMENT *

	-----IDLE NEUTRAL----					-------2500 RPM------					-----IDLE NEUTRAL----					----IDLE IN GEAR----				
	-----LAB----			GARAGE		-----LAB----			GARAGE		-----LAB----			GARAGE		-----LAB----			GARAGE	
TEST	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO
BI-1	133	.0	36	10	.0	81	.0	141	10	.0	93	.0	56	10	.0	87	.0	64	10	.0
BL-1	843	.0	36	130	.0	215	.0	138	30	.0	546	.0	59	80	.0	683	.0	101	100	.0
L1-1	1044	.0	34	200	.0	316	.0	129	80	.0	466	.0	64	100	.0	754	.0	94	140	.0
L2-1	959	.0	31	120	.0	252	.0	131	30	.0	567	.0	49	80	.0	858	.0	59	120	.0
L3-1	1060	.0	29	140	.0	338	.0	126	20	.0	754	.0	36	90	.0	999	.0	49	130	.0
L4-1	1127	.0	31	150	.0	393	.0	121	30	.0	735	.0	51	100	.0	846	.0	74	120	.0
L5-1	1005	.0	34	140	.0	332	.0	146	30	.0	595	.0	49	80	.0	803	.0	76	100	.0
L6-1	1412	.0	21	200	.0	295	.0	131	40	.0	745	.0	39	120	.0	901	.0	49	150	.0
L7-1	280	.0	11	40	.0	322	.0	131	30	.1	965	.0	39	120	.0	999	.0	49	130	.0
L8-1	1402	.0	19	180	.0	485	.0	113	20	.0	1228	.0	34	140	.0	1139	.0	46	140	.0
U1-1	1280	.0	34	160	.0	546	.0	99	60	.0	668	.0	49	90	.0	729	.0	44	100	.0
U2-1	1311	.0	34	160	.0	454	.0	111	40	.0	699	.0	46	60	.0	720	.0	61	80	.0
U3-1	1014	.0	29	120	.0	387	.0	111	20	.0	650	.0	41	80	.0	690	.0	56	80	.0
U4-1	833	.0	36	140	.0	677	.0	89	100	.0	506	.0	39	100	.0	558	.0	46	100	.0
* BEFORE CATALYST EMISSIONS MEASUREMENT *																				
BI-2	3173	.1	43	240	.1	1008	.1	155	80	.1	2415	.1	60	180	.1	2941	.1	90	220	.1
BL-2	3993	.1	40	330	.2	1405	.1	142	80	.2	2384	.1	63	170	.2	2803	.1	137	210	.1
L1-2	4123	.1	35	380	.1	1528	.1	110	90	.2	2366	.1	65	150	.1	2973	.1	117	210	.1
L2-2	4013	.1	38	300	.1	1405	.1	132	80	.1	2693	.1	63	200	.1	3223	.1	70	250	.1
L3-2	3333	.1	55	300	.1	1353	.1	130	70	.1	2793	.0	165	210	.1	3343	.1	78	260	.1
L4-2	4093	.1	40	300	.1	1423	.2	115	100	.1	2993	.1	58	220	.1	3263	.1	90	250	.1
L5-2	3113	.1	50	260	.1	1008	.1	150	50	.2	2369	.1	58	160	.1	3133	.1	110	230	.1
L6-2	4593	.1	38	350	.2	1222	.1	135	80	.2	2913	.1	53	200	.1	3123	.1	85	240	.1
L7-2	4794	.1	38	420	.1	1314	.1	132	90	.2	3293	.1	53	250	.1	3313	.1	73	260	.1
L8-2	4023	.1	35	380	.1	1381	.1	115	90	.1	3573	.1	43	350	.1	3113	.1	68	260	.1
U1-2	4423	.1	40	380	.2	1231	.2	102	100	.2	3393	.1	53	220	.1	3033	.1	65	240	.1
U2-2	6524	.1	40	450	.2	3373	.2	115	200	.2	4573	.1	53	320	.2	4393	.1	73	320	.1
U3-2	4223	.1	38	350	.2	1161	.1	117	80	.2	2613	.1	53	180	.2	2793	.1	80	200	.1
U4-2	4694	.1	30	400	.2	2048	.2	90	150	.2	3193	.1	38	200	.1	2893	.1	58	220	.1

TABLE 5.7-11 EPA NO. 09904 FOUR MODE TEST (SPARK PLUG DISABLED)

* NORMAL EMISSIONS MEASUREMENT *

	IDLE NEUTRAL					2500 RPM					IDLE NEUTRAL					IDLE IN GEAR				
	LAB			GARAGE		LAB			GARAGE		LAB			GARAGE		LAB			GARAGE	
TEST	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO
BI-1	16	.0	101	0	.0	3370	2.5	34	360	3.2	32	.0	96	0	.0	16	.0	181	0	.0
BL-1	821	.0	61	120	.0	1923	4.1	24	120	3.8	56	.0	106	20	.0	29	.0	161	20	.0
L1-1	530	.0	176	110	.0	6491	2.7	36	300	2.2	130	.0	186	40	.0	62	.0	285	30	.0
L2-1	4420	.0	39	520	.0	7911	1.2	24	840	1.1	203	.0	89	10	.0	124	.0	123	10	.0
L3-1	6691	.0	34	990	.0	7091	.3	16	700	.2	708	.0	84	50	.0	819	.0	96	60	.0
L4-1	3169	.0	34	420	.0	9982	3.7	19	1950	4.4	454	.0	86	20	.1	215	.0	111	0	.0
U1-1	5290	.0	131	700	.0	7461	.1	54	1180	.1	1867	.0	173	220	.0	2082	.0	206	240	.0
U2-1	6160	.0	34	900	.0	8291	.0	49	1010	.0	2369	.0	46	310	.0	2241	.0	71	300	.0
U3-1	4520	.0	36	640	.0	6711	.0	46	860	.0	1344	.0	61	200	.0	1271	.0	71	150	.0
U4-1	6561	.0	39	930	.0	7891	.0	54	1100	.0	1965	.0	59	260	.0	1913	.0	79	260	.0

* BEFORE CATALYST EMISSIONS MEASUREMENT *

BI-2	9985	.6	102	1400	.5	9985	4.7	60	2000	4.4	9985	.7	90	1620	.7	9985	.5	202	1580	.6
BL-2	9985	.5	90	1360	.4	9985	6.5	53	2000	6.7	9985	.6	105	1580	.6	9985	.5	165	1630	.5
L1-2	9985	1.1	170	1780	1.1	9985	5.7	68	2000	5.4	9985	1.2	172	2000	1.3	9985	.9	267	2000	1.0
L2-2	9985	.4	83	1440	.3	9985	5.2	58	2000	4.8	9985	.6	88	1620	.6	9985	.4	140	1650	.4
L3-2	9985	.4	85	1400	.5	9985	3.9	60	2000	3.6	9985	.4	102	1600	.6	9985	.3	127	1670	.4
L4-2	9985	.5	95	1500	.6	9985	6.9	50	2000	7.0	9985	.8	90	1620	.7	9985	.5	110	1570	.5
U1-2	9985	.6	177	1920	.6	9985	2.4	80	2000	2.5	9985	.6	185	2000	.7	9985	.7	249	2000	.6
U2-2	9985	.8	65	1480	.8	9985	1.0	95	1980	1.1	9985	.7	78	1700	.7	9985	.7	102	1800	.7
U3-2	9985	.7	78	1440	.8	9985	1.2	85	1820	1.2	9985	.8	78	1700	.8	9985	.8	98	1800	.7
U4-2	9985	.4	70	1420	.4	9985	.5	100	1740	.6	9985	.4	83	1720	.4	9985	.4	110	1820	.4

TABLE 5.7-12 EPA NO. 09906 FOUR MODE TEST (SPARK PLUG DISABLED)

* NORMAL EMISSIONS MEASUREMENT *

	IDLE NEUTRAL					2500 RPM					IDLE NEUTRAL					IDLE IN GEAR				
	LAB			GARAGE		LAB			GARAGE		LAB			GARAGE		LAB			GARAGE	
TEST	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO
BI-1	108	.0	86	10	.0	84	.0	84	10	.0	138	.0	91	10	.0	138	.0	136	10	.0
BL-1	6240	.0	34	960	.0	3270	.5	24	320	.6	157	.0	94	10	.0	105	.0	128	10	.0
L1-1	7571	.0	34	1150	.0	5190	.1	39	420	.1	616	.0	81	60	.0	653	.0	99	60	.0
L2-1	9982	.0	34	2000	.0	9982	.1	46	2000	.1	3840	.0	59	500	.0	3460	.0	96	420	.0
L3-1	9982	.0	29	1700	.0	9982	.2	31	2000	.3	4190	.0	54	500	.0	3290	.0	86	350	.0
L4-1	8551	.0	54	1180	.0	9982	.4	56	1800	.5	5660	.0	51	720	.0	5310	.0	74	700	.0
U1-1	5790	.0	49	880	.0	8711	.0	64	1180	.1	2314	.1	56	350	.0	2397	.0	79	360	.0
U2-1	7601	.0	51	1020	.0	9982	.1	66	1700	.1	5490	.0	71	780	.0	4610	.0	74	640	.0
U3-1	6711	.0	61	950	.0	9121	.0	111	1300	.0	2429	.0	71	350	.0	2239	.0	96	320	.0
U4-1	7591	.0	59	1060	.0	8891	.0	101	1210	.0	2556	.0	71	360	.0	2513	.0	99	360	.0
U5-1	6331	.0	56	920	.0	9982	.0	86	1400	.0	2289	.0	61	320	.0	2279	.0	101	320	.0

* BEFORE CATALYST EMISSIONS MEASUREMENT *

BI-2	9985	.5	88	1380	.4	9985	2.1	68	2000	2.0	9985	.5	90	1570	.5	9985	.5	152	1630	.6
BL-2	9985	.1	78	1300	.1	9985	4.1	60	2000	4.5	9985	.1	102	1580	.2	9985	.1	160	1630	.1
L1-2	9985	.1	80	1350	.1	9985	2.4	83	2000	2.2	9985	.1	88	1560	.2	9985	.1	132	1650	.2
L2-2	9985	.1	80	2000	.1	9985	.5	95	2000	.6	9985	.1	90	2000	.1	9985	.1	130	2000	.1
L3-2	9985	.1	85	2000	.1	9985	2.4	63	2000	2.5	9985	.1	95	2000	.2	9985	.1	152	2000	.2
L4-2	9985	.2	78	1230	.1	9985	2.2	68	2000	2.1	9985	.3	90	1420	.3	9985	.2	140	1480	.2
U1-2	9985	.4	63	1340	.4	9985	1.2	80	2000	1.5	9985	.4	70	1530	.4	9985	.3	102	1620	.3
U2-2	9985	.2	60	1190	.2	9985	1.4	65	1900	1.5	9985	.3	68	1390	.3	9985	.3	95	1460	.3
U3-2	9985	.3	80	1250	.2	9985	.9	115	1950	.9	9985	.3	88	1440	.2	9985	.3	117	1500	.3
U4-2	9985	.2	80	1200	.2	9985	1.2	105	1900	1.1	9985	.4	88	1460	.5	9985	.3	115	1460	.3
U5-2	9985	.3	78	1240	.3	9985	1.7	83	2000	1.5	9985	.4	85	1540	.3	9985	.3	137	1540	.3

TABLE 5.7-13 EPA NO. 92305 FOUR MODE TEST (SPARK PLUG DISABLED)

* NORMAL EMISSIONS MEASUREMENT *

	IDLE NEUTRAL					2500 RPM					IDLE NEUTRAL					IDLE IN GEAR				
	LAB			GARAGE		LAB			GARAGE		LAB			GARAGE		LAB			GARAGE	
TEST	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO	HC	CO	NOX	HC	CO
BI-1	237	.0	36	30	.0	806	.0	136	120	.0	50	.0	96	10	.0	32	.0	285	0	.0
BL-1	5510	.0	29	820	.0	6361	.0	106	900	.0	4970	.0	36	740	.0	5190	.0	178	770	.0
L1-1	5830	.0	26	880	.0	6871	.1	91	900	.1	4970	.0	34	700	.0	5330	.0	49	740	.0
L2-1	5650	.0	24	820	.0	7691	.1	111	1000	.1	5740	.0	29	840	.0	5860	.0	56	850	.0
L3-1	6461	.0	16	940	.0	9021	.1	89	1060	.1	6491	.0	29	900	.0	6491	.0	74	920	.0
L4-1	5020	.0	21	700	.0	7771	.0	89	960	.0	5270	.0	31	740	.0	5300	.0	44	780	.0
L5-1	5120	.0	24	690	.0	8411	.1	111	960	.0	5380	.0	34	700	.0	5310	.0	64	720	.0
L6-1	5670	.0	14	800	.0	8621	.1	81	990	.1	5640	.0	31	750	.0	5530	.0	36	780	.0
L7-1	6210	.0	26	860	.0	8491	.1	131	980	.1	6551	.0	34	860	.0	6270	.0	39	860	.0
L8-1	6010	.0	19	810	.0	8911	.1	79	1010	.1	6090	.0	29	790	.0	6000	.0	36	800	.0
U1-1	3209	.0	29	410	.0	7491	.0	79	830	.0	3690	.0	39	470	.0	3450	.0	44	440	.0
U2-1	3420	.0	26	440	.0	7561	.0	84	840	.0	3660	.0	39	450	.0	3600	.0	74	460	.0
U3-1	3620	.0	26	450	.0	7921	.0	99	840	.0	3920	.0	41	480	.0	3860	.0	71	470	.0
U4-1	3310	.0	26	460	.0	6351	.0	81	820	.0	3290	.0	31	480	.0	3229	.0	39	450	.0

* BEFORE CATALYST EMISSIONS MEASUREMENT *

BI-2	9985	.1	40	1400	.1	9985	.1	157	980	.1	9985	.2	102	1500	.2	9985	.1	334	1650	.1
BL-2	9985	.1	43	1400	.1	9985	.1	160	1100	.1	9985	.1	75	1450	.1	9985	.1	297	1620	.1
L1-2	9985	.1	35	1300	.1	9835	.1	117	920	.2	9985	.1	53	1340	.1	9985	.1	90	1300	.1
L2-2	9985	.1	33	1450	.1	9985	.1	152	1080	.1	9985	.1	63	1450	.1	9985	.1	125	1480	.1
L3-2	9985	.1	35	1370	.1	9985	.1	140	1040	.2	9985	.1	60	1420	.1	9985	.1	152	1510	.1
L4-2	9985	.1	40	1340	.1	9985	.1	135	1020	.1	9985	.1	55	1380	.1	9985	.1	117	1400	.1
L5-2	9985	.1	38	1300	.1	9985	.1	157	1020	.2	9985	.1	65	1410	.1	9985	.1	130	1450	.1
L6-2	9985	.1	35	1320	.1	9985	.1	147	1010	.1	9985	.1	53	1400	.1	9985	.1	95	1420	.1
L7-2	9985	.1	38	1460	.1	9985	.1	175	1340	.2	9985	.1	55	1540	.1	9985	.1	78	1830	.1
L8-2	9985	.1	33	1350	.1	9985	.1	142	1150	.1	9985	.1	65	1300	.1	9985	.1	73	1350	.1
U1-2	9985	.1	33	1300	.1	9625	.2	115	920	.2	9985	.1	50	1320	.1	9985	.1	93	1380	.1
U2-2	9985	.1	35	1320	.1	9765	.1	105	900	.2	9985	.1	50	1380	.1	9985	.1	95	1420	.1
U3-2	9985	.1	40	1400	.1	9755	.1	117	920	.2	9985	.1	53	1340	.1	9985	.1	102	1420	.1
U4-2	9985	.0	140	1310	.1	9985	.1	110	1180	.2	9985	.1	45	1350	.1	9985	.1	48	1350	.1

TABLE 5.7-14 EPA NO. 09904 PROPANE INJECTION TEST

BASELINE UNLEADED			BASELINE LEADED			1ST TANK LEADED			2ND TANK LEADED			3RD TANK LEADED			4TH TANK LEADED		
RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%
750	17	0.0	730	28	0.0	790	10	0.0	750	9	0.0	750	24	0.0	740	19	0.0
830	18	0.0	780	36	0.0	830	11	0.0	810	101	0.0	810	32	0.0	780	76	0.0
750	19	0.0	820	37	0.0	810	14	0.0	770	20	0.1	770	54	0.0	730	60	0.0
700	19	0.0	770	43	0.0	720	13	0.0	710	21	0.1	730	64	0.0	690	72	0.0
650	34	0.9	730	35	0.0	670	83	2.0	660	95	0.4	670	55	0.0	640	155	2.0
600	62	3.3	680	34	0.0	610	102	2.7	620	274	1.9	610	69	1.3	590	342	3.7
560	74	4.7	630	45	1.4	550	138	6.1	600	261	3.6	530	166	3.3	520	409	4.6
			590	75	3.4				510	299	5.3	460	426	6.0			
			530	107	5.3												
			470	157	7.5												

1ST TANK UNLEADED			2ND TANK UNLEADED			3RD TANK UNLEADED			4TH TANK UNLEADED		
RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%
720	20	0.0	720	10	0.0	670	10	0.0	720	0	0.0
760	20	0.0	760	60	0.0	730	30	0.0	750	20	0.0
710	40	0.0	730	160	0.0	690	220	0.0	690	60	0.0
670	50	0.1	690	160	0.0	650	200	0.0	650	90	0.0
610	50	0.7	670	110	0.0	620	230	0.3	600	150	0.5
560	60	1.7	640	170	0.3	540	330	1.0	540	220	1.3
490	240	3.9	540	380	1.9	490	310	1.2	480	220	1.6
			500	350	2.3	460	300	2.2	430	210	2.0

TABLE 5.7-15 EPA NO. 09906 PROPANE INJECTION TEST

BASELINE UNLEADED			BASELINE LEADED			1ST TANK LEADED			2ND TANK LEADED			3RD TANK LEADED			4TH TANK LEADED		
RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%
730	0	0.0	710	10	0.0	680	10	0.0	740	0	0.0	750	10	0.0	720	10	0.0
790	110	0.0	780	30	0.0	730	0	0.0	800	60	0.0	820	10	0.0	760	50	0.0
750	20	0.0	820	70	0.0	780	0	0.0	760	280	0.0	900	10	0.0	820	170	0.0
710	120	0.5	740	140	0.0	740	10	0.0	680	290	0.0	960	10	0.0	780	440	0.2
650	150	1.2	670	30	0.1	660	10	0.0	640	180	0.4	870	0	0.0	750	440	0.2
600	150	2.2	610	90	1.0	610	10	0.5	590	260	0.3	820	10	0.0	720	320	0.2
540	120	2.5	590	90	1.0	490	40	0.9	460	230	0.4	770	10	0.1	660	180	0.7
			530	120	1.2							720	10	0.2	620	430	1.5
			490	110	1.1							690	20	0.5	560	630	2.1
												660	30	0.5			
												630	30	0.5			
												520	30	0.5			

1ST TANK UNLEADED			2ND TANK UNLEADED			3RD TANK UNLEADED			4TH TANK UNLEADED			5TH TANK UNLEADED		
RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%
710	10	0.0	730	10	0.0	750	10	0.0	750	20	0.0	740	30	0.0
770	150	0.0	770	260	0.0	800	180	0.0	800	170	0.0	790	260	0.0
800	600	0.0	710	300	0.0	840	290	0.0	830	350	0.0	830	540	0.0
750	510	0.0	670	220	0.0	830	450	0.0	770	330	0.0	780	380	0.1
700	290	0.1	590	210	0.0	770	400	0.0	730	240	0.0	730	300	0.1
650	370	1.2	570	90	0.0	710	310	0.0	680	290	0.7	690	250	0.5
580	560	2.0	480	70	0.1	670	460	1.4	630	550	2.2	630	540	1.7
520	560	3.5				620	670	2.3	560	600	2.8	560	640	2.3
						570	700	3.1						

TABLE 5.7-16 EPA NO. 92305 PROPANE INJECTION TEST

BASELINE UNLEADED		
RPM	HC(PPM)	CO%
710	26	0.0
760	35	0.0
800	59	0.0
860	257	1.7
820	411	0.0
790	1285	6.8
730	2056	6.7
710	2093	5.4
660	2093	4.2
580	2093	3.6
550	2093	2.3

BASELINE LEADED		
RPM	HC(PPM)	CO%
660	197	0.0
710	184	0.0
760	119	0.0
800	140	0.0
860	150	1.1
800	400	6.3
730	578	8.4
690	950	9.8
650	1229	9.9
590	2093	9.7
550	2093	9.3

1ST TANK LEADED		
RPM	HC(PPM)	CO%
660	225	0.0
730	159	0.0
780	132	0.1
840	278	3.8
800	412	5.5
750	677	6.8
710	1759	7.2
690	2093	6.5
590	2093	5.5
520	2093	9.4
470	2093	8.9

2ND TANK LEADED		
RPM	HC(PPM)	CO%
630	245	0.0
690	131	0.0
740	97	0.0
780	141	0.3
830	206	1.5
780	509	8.5
740	656	9.4
680	812	9.7
620	1126	10.1
560	2026	10.0
510	2093	9.2
430	2093	7.4

3RD TANK LEADED		
RPM	HC(PPM)	CO%
660	237	0.1
710	126	0.1
760	129	0.1
810	142	0.4
850	236	3.3
790	498	8.4
750	631	9.6
710	809	10.0
670	1406	10.5
630	1550	10.6
590	2093	10.5
550	2093	10.1
510	2093	9.6

4TH TANK LEADED		
RPM	HC(PPM)	CO%
670	180	0.0
740	140	0.0
790	90	0.0
840	100	0.1
850	220	1.9
820	290	2.9
770	470	3.9
730	620	4.8
690	810	5.2
650	1650	5.3
620	2200	5.3
580	3040	5.0
520	2970	4.4

5TH TANK LEADED		
RPM	HC(PPM)	CO%
670	120	0.0
730	120	0.0
810	90	0.5
840	80	0.1
870	100	1.0
890	150	2.6
860	200	3.4
820	260	4.6
790	320	5.0
740	450	5.5
680	640	5.9
630	970	6.1
560	1430	6.1
530	2970	5.3

6TH TANK LEADED		
RPM	HC(PPM)	CO%
630	150	0.0
680	90	0.0
710	110	0.0
760	110	0.0
820	110	0.7
850	140	1.7
820	240	3.9
770	340	4.6
740	580	4.9
710	760	5.0
680	1170	5.0
640	1820	4.7
590	2690	4.3
540	2970	3.5
520	2970	2.9

7TH TANK LEADED		
RPM	HC(PPM)	CO%
670	30	0.0
750	30	0.2
830	40	0.6
800	70	1.3
760	100	1.6
720	130	1.7
680	140	1.8
620	200	1.8
570	290	1.8
530	430	1.6
480	610	1.5

8TH TANK LEADED		
RPM	HC(PPM)	CO%
630	30	0.0
700	20	0.0
750	20	0.0
800	10	0.0
830	10	0.1
880	20	0.1
840	30	0.6
790	50	0.7
710	50	0.8
610	80	0.7
550	110	0.6
520	140	0.5
480	120	0.4

TABLE 5.7-16 (CONT'D) EPA NO. 92305 PROPANE INJECTION TEST

1ST TANK UNLEADED			2ND TANK UNLEADED			3RD TANK UNLEADED			4TH TANK UNLEADED		
RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%	RPM	HC(PPM)	CO%
640	20	0.0	660	20	0.0	670	90	0.0	670	100	0.0
710	20	0.0	730	10	0.0	730	50	0.0	750	60	0.0
760	10	0.0	790	10	0.0	780	50	0.0	790	130	0.2
830	10	0.1	870	10	0.0	840	110	1.3	850	200	2.2
780	20	0.3	890	20	0.1	870	180	2.6	800	450	5.5
760	50	1.0	850	30	0.4	850	270	4.4	740	730	7.2
700	80	1.2	800	50	0.6	810	300	4.9	700	850	7.5
670	100	1.3	770	80	0.7	730	440	5.9	630	1270	7.7
650	140	1.2	730	90	0.8	660	630	6.3	590	1720	7.8
580	120	1.0	700	90	0.6	620	1120	6.7	520	2330	7.7
540	120	0.7	650	100	0.6	570	1560	6.6	480	2970	5.8
510	160	0.6	600	150	0.4	510	2440	6.2			
			570	190	0.3						
			510	110	0.2						

TABLE 5.7-17 MILEAGE ACCUMULATION & FUEL USAGE

EPA NO. 09904 1980 CHEVROLET CITATION

TEST	DATE	ODOM	FUEL ADDED	CALCULATED MPG	COMPOSITE MPG
Baseline FTP	6-13-80	1153	5.0	----	
Baseline HSFTP (Unleaded)	6-17-80	1198	5.0	----	
Baseline HSFTP (Leaded)	6-18-80	1230	8.7	----	
HSFTP 1st Tank (Leaded)	6-19-80	1556	11.6	28.1	
HSFTP 2nd Tank (leaded)	6-23-80	1825	9.8	27.4	
HSFTP 3rd Tank (Leaded)	6-25-80	2098	11.1	24.6	25.34
HSFTP 4th Tank (Leaded	6-26-80	2317	10.4	21.1	
Drained Leaded and Refilled with Unleaded		2354	14.0	----	
HSFTP 1st Tank (Unleaded)	6-30-80	2585	11.0	21.0	
HSFTP 2nd Tank (Unleaded)	7-3-80	2841	12.5	20.5	
HSFTP 3rd Tank (Unleaded)	7-7-80	3116	12.5	22.0	20.75
HSFTP 4th Tank (Unleaded)	7-9-80	3325	10.8	19.4	
Final Baseline FTP	7-10-80	3376	----	----	

EPA NO. 09906 1980 CHEVROLET CITATION

TEST	DATE	ODOM	FUEL ADDED	CALCULATED MPG	COMPOSITE MPG
Baseline FTP	6-12-80	1373	5.0	----	
Baseline HSFTP (Unleaded)	6-13-80	1387	5.0	----	
Baseline HSFTP (Leaded)	6-18-80	1418	12.3	----	
HSFTP 1st Tank (Leaded)	6-20-80	1673	10.5	24.3	
HSFTP 2nd Tank (Leaded)	6-24-80	1943	11.0	24.5	
HSFTP 3rd Tank (Leaded)	6-27-80	2174	9.3	24.8	25.48
HSFTP 4th Tank (Leaded)	7-1-80	2435	9.1	28.7	
Drained Leaded and Refilled with Unleaded		2465	14.0	----	
HSFTP 1st Tank (Unleaded)	7-3-80	2703	10.7	22.2	
HSFTP 2nd Tank (Unleaded)	7-7-80	2918	11.4	18.9	
HSFTP 3rd Tank (Unleaded)	7-10-80	3177	12.5	20.7	20.29
HSFTP 4th Tank (Unleaded)	7-14-80	3417	12.4	19.4	
HSFTP 5th Tank (Unleaded)	7-16-80	3654	11.6	20.4	
Baseline FTP	7-17-80	3687	----	----	

TABLE 5.7-17 (Cont'd) MILEAGE ACCUMULATION & FUEL USAGE

EPA NO. 92305 1979 CHEVROLET CAPRICE

TEST	DATE	ODOM	FUEL ADDED	CALCULATED MPG	COMPOSITE MPG
Baseline FTP	6-12-80	7496	8.0	----	
Baseline HSFTP (Unleaded)	6-13-80	7549	8.0	----	
Baseline HSFTP (Leaded)	6-18-80	7581	18.0	----	
HSFTP 1st Tank (Leaded)	6-20-80	7829	13.7	18.1	
HSFTP 2nd Tank (Leaded)	6-24-80	8098	15.1	17.8	
HSFTP 3rd Tank (Leaded)	6-27-80	8333	14.6	16.1	
HSFTP 4th Tank (Leaded)	7-1-80	8557	13.8	16.2	16.40
HSFTP 5th Tank (Leaded)	7-3-80	8831	20.0	13.7	
HSFTP 6th Tank (Leaded)	7-7-80	9049	15.5	14.1	
HSFTP 7th Tank (Leaded)	7-10-80	9317	15.1	17.7	
HSFTP 8th Tank (Leaded)	7-14-80	9601	15.6	18.2	
Drained Leaded and Refilled with Unleaded		9770	20.0	----	
HSFTP 1st Tank (Unleaded)	7-16-80	10040	16.8	16.1	
HSFTP 2nd Tank (Unleaded)	7-17-80	10296	15.7	16.3	
HSFTP 3rd Tank (Unleaded)	7-18-80	10529	15.4	15.1	15.79
HSFTP 4th Tank (Unleaded)	7-21-80	10784	16.3	15.6	
Final FTP Baseline	7-22-80	10813	----	----	

Note: The odometer readings and fuel added were made at the start of the specified test.